River Continuity Assessment of the Ashuelot River Watershed

Quality Assurance Project Plan

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3. Distribution List

Doug Bechtel, The Nature Conservancy
Peter Ingraham, The Nature Conservancy
David Moon, Ashuelot Valley Environmental Observatory
Jillian Jones, New Hampshire Department of Environmental Services
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Mark Prout, White Mountain National Forest
Warren Howard, US Environmental Protection Agency

4. Project / Task Organization

Project management will be under Doug Bechtel, Director of Conservation Science for the New Hampshire Chapter of The Nature Conservancy (TNC), and he will share QA Management responsibilities with David Moon, Executive Director of Ashuelot Valley Environmental Observatory (AVEO). AVEO will likely hire a student or new employee to take the role of QA Officer during the 2007 field season when volunteers are delivering data to AVEO. David Moon will have primary responsibility for managing volunteers, including identification, recruitment, and volunteer training, as well as several data management responsibilities. Peter Ingraham, TNC's Conservation and GIS Information Manager, will provide both up-front support through development of maps and field forms, as well as follow-up data management and compilation at the completion of 2007 field season. He will also play a key role in data analysis and interpretation as we complete project reports and maps.

In addition to these project team members, key partners who will use the information to plan and prioritize bridge maintenance, ecological restoration, conservation planning, etc., will have multiple opportunities to contribute feedback and suggestions both at the start and throughout the project timeline. For example, we held an informational meeting to present our project goals and protocols with staff from agencies who have expertise in aquatic ecology, bridge and culvert maintenance, and/or are familiar with the watershed, including:

- Fisheries staff from NH Department of Fish and Game;
- Engineers and staff from NH Department of Transportation;
- Staff from both the Connecticut River Joint Commissions and Connecticut River Watershed Council, who either directly or indirectly support this project and have interests in the Ashuelot River Watershed;
- Staff from the Ashuelot River Local Advisory Committee;
- Staff from the US Army Corps of Engineers Surry Mountain and Otter Brook Dam Project Areas;
- Ecology and natural resource professors from local academic institutions.

While these staff will not serve directly as QAPP team members, we are soliciting their input and advice early in the refinement of our field protocol, and welcome support, both in the recruitment of volunteers, and to help gather information on both specific river sites as well as information on aquatic ecology. For example, staff at NH DOT are interested in this information since it will help prioritize bridge and/or culvert maintenance schedules. Their feedback is essential to ensure we can collect field

information in a way that is useful to regional engineer staff who are working to implement maintenance and bridge restoration throughout the watershed.

5. Problem Definition / Background

The Ashuelot River in southwestern New Hampshire is a major and highly intact tributary to the Connecticut River, and it supports both globally-rare aquatic species as well as natural features unique in New Hampshire. Although the watershed retains much of its ecological integrity, water quality impairments exist due to aquatic fragmentation, including dams and inadequate road-stream crossings. These structures impact natural connections to aquatic species and natural processes. For example, anadromous fish species, such as Atlantic salmon and American shad once traveled up the Ashuelot to breed, but dams do not currently allow for upstream fish passage. Road-stream crossings are also locations where other wildlife species, such as turtles, salamanders, otter, mink, and other mammals frequently cross roads. These species travel along streams and must navigate certain barriers, including car traffic, pavement, curbing, etc. on their daily rounds.

According to geospatial data from the New Hampshire Department of Environmental Services and other sources, the watershed contains more than 150 active dams and over 1,400 road-stream crossings. The numerous medium-to-small sized dams vary greatly in condition and degree of impact. There is currently no definitive inventory of the number and condition of dams and road-stream crossings and their associated impact on aquatic habitat and river fragmentation, despite widespread recognition of the need and several efforts to do so. These dams, culverts, bridges, channels, and so on, influence the ability of fish and other aquatic organisms to move within and between stream systems, and may restrict life-history stages during different seasons and under different flow regimes. Such structures fragment aquatic and riparian habitat by precluding movement entirely, restricting movement, increasing mortality as a result of passage, or essentially isolating fish and other organisms to unsuitable habitat. Areas immediately downstream of culverts may also be deprived of essential sediment inputs, and thus become overly incised and exhibit degraded in-stream habitat conditions.

Academic or consulting aquatic ecologists will assess the extent to which a select group of aquatic organisms and key hydrological processes are impaired by barriers through both journal and “grey” literature review. For example, we want to answer questions such as, is the opportunity for passage once a year during spring high water adequate for a given species?

We will also conduct a GIS analysis to determine the relative amount of in-stream habitat connectivity that would be offered by the establishment of fish passage at each problematic barrier, and solicit expert review and input to establish restoration priorities. The results of the project will provide the State’s first watershed-scale assessment of aquatic habitat fragmentation and restoration priorities, creating a new opportunity for linking transportation planning/enhancement and aquatic ecosystem restoration. This effort may serve as a model for other watersheds.

Note: Flooding in southwest New Hampshire in the Fall of 2005, after applying for and securing Section 319 Watershed Assistance funds, significantly altered many of the tributary conditions in the Ashuelot Watershed. While we do not expect to significantly alter our field protocol, sampling design, or analysis, there may be some sites where floods altered dams, bridges, and culverts enough to change our approach. For example, there may be some bridges that are no longer safe for volunteers to assess, or there may be culverts that were damaged or removed by flooding. We will train volunteers to record information about such obvious changes and ensure that they approach all sites with caution; safety is one of our primary concerns. Any deviations will be recorded and documented in our regular progress and final reports.

6. Project / Task Description

The project will require considerable field-work to allow for assessments of dams, culverts, and road-stream crossings on site (Appendix A, B). During the first several months of the project, we will also be working to coordinate, organize, and train volunteers with Ashuelot Valley Environmental Observatory (AVEO). During the Spring, Summer and Fall of 2006, our efforts will focus on field data collection, on-going mapping, documentation of sites, and data management. Measurements to be made are outlined on the Field Data Form (Appendix B). Measurements will be taken following the standard procedures as outlined in the Field Data Form Instructions (Appendix C) and the DES photographic documentation SOP (Appendix D). We expect to complete fieldwork in Fall 2006, in time for mapping, analysis, and report writing completed by February 2007. We expect to share results during the Winter and Spring of 2007.

There are no special personnel or equipment requirements to conduct tasks besides the volunteer training detailed in Section 8, Training Requirements, below.

Proposed Time Frame:

- QAPP preparation with DES: June-December 2005
- QAPP Review with EPA: December 2005
- QAPP process complete: January 2006
- Site identification and mapping, volunteer training and coordination: Summer/Fall/Winter 2005
- Field tests to finalize protocols: Fall 2005
- Semi-Annual Report: December 2005
- Field data collection: Spring/Summer/Fall 2006
- Semi-Annual Report: June 2006
- Analysis, report drafting, and map preparation: Fall/Winter 2006
- Semi-Annual Report: December 2006
- Final Analysis, Report Delivery: February 2007
- Outreach to agencies, towns, and other stakeholders: February-April 2007

7. Data Quality Objectives for Measurement Data

The data quality indicators for this project cannot be quantitatively expressed. Every site visit (i.e. bridge, dam, or culvert) will have unique features, so we are not necessarily interested in measurement quality objectives in the same way as those required based on instrumentation and stratified and/or random sampling of a statistical population. Our goal is to visit as many bridges culverts and dams as possible in the entire watershed. Based on experience with other watersheds of this size, we have fairly high confidence that all sites can be sampled with a dedicated team of 25-30 volunteers.

Precision

Field forms are designed to be as unambiguous as possible, and most fields require judgement-based answers to yes-no questions, with some field measurements using meter tapes (see attached field form and field form instructions, Appendix B, C). All sites will require the same measurements. All volunteers will be trained to read and record meter tape measurements to the nearest hundredth of a meter. Our Site Database (see below) will track not only the locations of sites recorded, but also the volunteers trained and assigned to each site.

Accuracy

We expect there to be a range of bridge and culvert types, sizes, designs, and relative integrity (i.e. structural condition), and our field form will capture the range of possibilities. All sites will require meter tape measurements and we will train volunteers to record all measurements to hundredth of a meter.

Measurement Range

All volunteers will be provided with 50 meter graduated metric field tapes manufactured by Keson and readily available from Ben Meadows, Forestry Suppliers, and other scientific supply catalogs. Fiberglass tapes are resistant to change in accuracy from tension and temperature extremes.

Representativeness

Preliminary GIS analysis of mapped roads and streams have identified 1,497 locations where a road crosses a stream in the Ashuelot River Watershed. In addition, 150 dam locations have been identified in the Watershed through both state databases and the National Inventory of Dams (NID), but many of these do not coincide with a mapped river course (for example, many dams appear to control the level of small ponds). Dams typically provide more of a challenge for this kind of project given access and land permission requirements.

We will visit as many road-stream crossings and dam sites identified in the site selection process as is feasible, based on volunteer and/or intern training, safety concerns, accessibility, weather, and flow conditions. Other continuity projects in Massachusetts (i.e.Westfield River Watershed) have had good success visiting nearly this many sites with only 10 dedicated volunteers.

We will develop a systematic GIS database of sites prior to training volunteers. The site selection process will be based on a grid layout of the watershed, with volunteers assigned to all sites within a grid cell. With this approach, we expect geographic representation across the watershed that will include multiple river and crossing scales (headwaters, tributaries, and mainstem river crossings). Based on site selection (see Sampling Process Design below), we hope to visit at least 90% of the sites we identify (approximately 1,350 road-stream crossings and 135 dams).

All field volunteers will be trained to read tape measures to the nearest hundredth of a meter so that each required measurement provides an accurate depiction of what is truly at the site.

Completeness

We will visit all sites identified in the site selection process, where feasible (see Sampling Process Design below). Sites not visited will be recorded and tracked in a Site Database (see below). As time and staffing permits, missed sites will be visited by the Project Manager or other Project staff. All field forms must be completed in their entirety. Field forms will be copied and stored at The Nature Conservancy field office in Concord, NH.

Comparability

We are adopting field forms and data measurement and analysis tools from the Massachusetts RiverWays Program and The Nature Conservancy. Our data should be directly comparable to theirs.

8. Training Requirements

All volunteers must attend at least one of the training sessions AVEO and TNC will conduct in the early Spring, 2006. We will hold a minimum of four training sessions in locations throughout the Watershed to encourage participation and make it easier for volunteers to attend. It is anticipated that at least two training sessions will occur in the Keene area, since this is the most populous and central municipality in the watershed. We will supplement this with at least two additional trainings, one in the northern portion of the watershed, and one south of Keene.

The training consists of a three hour session split into two parts. The first part is a presentation that focuses on the relevance of the project, reviews the components of the field forms, and covers questions such as: Why should we care? How do fish respond to fragmenting features? What are some of the consequences of failing culverts? The field form is accompanied by detailed instructions that provide point-by-point details and examples for each parameter on the field form (Appendix A-C).

The second part is a field visit to compare two road-stream crossings and fill out field forms. Trainers will ensure that volunteers understand each component of the field form and the ancillary tasks, such as photo documentation.

Staff from AVEO and TNC will both be present at training sessions. There are no certification requirements per se. However, we have developed standards that all volunteers must adhere to in addition to the actual field data collection:

- All site visits must be conducted with at least two people present. This will contribute to the safety of volunteers, and completeness of the field information. For example, some field measurements require two people, such as taking photographs at sites, and using the measuring tape.
- Safety is a primary concern for this project. Volunteers will be parking along roads and highways. We will provide orange safety vests and will advise people on the best way to park and approach field sites.

9. Documentation and Records

Each volunteer is assigned a selection of sites to visit, with each site requiring the completion of one field form, and at least two site photographs. Film and/or digital images must be delivered with original completed field forms to the QA Officer at AVEO in Keene. All photographs will adhere to *Photo Documentation Procedure for Measuring Success of Restoration Projects and Best Management Practices*, provided by NH Department of Environmental Services (Appendix D). The QA officer will make two copies of each field form, one to be archived with AVEO, and one copy plus originals to be archived at TNC.

Each field form requires information specific to the site, and basic information such as date, volunteer name, phone number and address, stream or river name, road name, town, and photographic identification information. Should any questions arise regarding the completeness or accuracy of the information on the field form, the QA Officer will have contact information for the volunteer on the field form.

As soon as information is delivered to AVEO, the QA Officer will record what sites were visited and who did the field work. We will develop an MS Excel spreadsheet (Site Database) that tracks the sites visited by who and when field data was collected. This will make it easier for the QA Officer to track what sites have been completed and those remaining. Digital information will be housed on AVEOs computer network and/or hard-drives and backed up on CDs.

Field forms delivered to TNC in Concord will be archived and used for data entry into the master spreadsheet that houses information on bridge, dam, and culvert characteristics (Culvert and Dam Database). Original paper forms, one paper copy, and paper photographs will be stored in manilla folders and stored in standard file cabinets and boxes. Digital photographs will be stored on the office network at TNC in Concord and backed up to CDs. All additional digital information (MS Excel spreadsheets) will be stored on TNC's office network, with accompanying CD backups. TNC's network hard drive is backed up on computer tape nightly.

10. Sampling Process Design

Volunteers will visit sampling sites that have been pre-determined and mapped prior to field season. Using GIS, we have identified sampling site locations where mapped roads (2004 NH DOT road coverage) cross mapped streams from 1:100,000 US EPA RF3 linework (2001) for road-stream crossings. In addition, we will identify dam sampling site locations using the 2004 NH Department of Environmental Services Dam coverage for dams registered with the DES Dam Bureau. With GIS, we will divide the Ashuelot River Watershed into quadrats approximately 5,000 acres in size and assign volunteers to a set number of sites defined by the quadrat divisions. This 9 x 15 grid, covering approximately 800,000 acres was determined by AVEO staff to cover the entire Ashuelot River Watershed and surrounding areas. Each grid cell contains between approximately 5 and 50 crossings and 2 to 20 dams.

Each volunteer is responsible for all road-stream crossings and dams located within the quadrat assigned. We will assign quadrats based on volunteer preference, ease of access (proximity to their home, for example), and the number of sites within each grid cell. We may also re-delineate grids depending on volunteers and density of sites.

Each site will have a unique code assigned to it, based on the quadrat and a unique numerical identifier code assigned by GIS. These will be pre-recorded onto field forms prior to delivering field forms to the volunteers. In addition, location information on the field form (e.g. town, road name, stream or river name, other unique location information) will ensure that site locations can be correctly matched to the field forms. NH DOT staff have supplied TNC with their list of bridges; their unique code will be also pre-loaded onto field forms to ensure that DOT staff can match site information to their bridge database, where appropriate. Finally, all codes will be recorded on photographs as well, to ensure field forms and photos coincide with correct site locations.

Each site requires a single visit. We anticipate sites will be visited starting in June, 2006 and field work completed by September 30, 2006 in order to leave enough time for data delivery to AVEO and TNC offices, data analysis and final report drafting. Our goals is to visit at least 90% of the sites we identify (approximately 1,350 road-stream crossings and 135 dams).

Volunteers will be supplied with orange safety vests to be worn at all times during field work. All volunteers will also be provided with all field gear they need to complete the field forms, including forms, clipboards, erase boards for photo-documentation, safety vests, meter measuring tapes, etc. Volunteers are expected to drive to each location, or hike along dirt roads if necessary (i.e to access railroad crossings, Class 6 road-stream crossings, etc.). Since most of the field sampling will occur during summer, flow conditions in streams are expected to be low. However, sampling can occur at any flow conditions, except flood stage.

Volunteers will visit sites throughout the summer, which is generally the time of year when low flows occur in the rivers. However, rain events and stretches of wet weather

can elevate flows. There is space on the field form to record relative flow volumes, but volunteers will be instructed to not visit sites during storm events. After delivery of field forms, the Data Manager will record the Ashuelot River flow as recorded at the Surry Mountain, near Keene USGS gage for the date on the field form. This will help the Data Manager and Project QA Managers to assess the accuracy of field form answers regarding flow.

All access to bridges and culverts is by car, not by volunteers walking up- or downstream in the river or stream itself. Volunteers must respect No Trespassing signage, particularly at dam locations. If landowner permission is required, sites will be referred back to the Project Manager who will attempt to obtain landowner permission.

Any deviations, changes, or updates of this protocol will be recorded by the Project QA Managers (AVEO, TNC) and/or Data Manager (TNC) and recorded in the regular project updates to NH DES, and in the Methods Section of the final report.

11. Sampling Method Requirements

The sampling design for road-stream crossings is based around two issues: characteristics of the road, and characteristics of the stream (see attached field form and field form instructions, Appendix A-C). For road characteristics, volunteers record number of travel lanes, features that may inhibit animals from crossing the road (such as traffic volume, fencing, jersey barriers, etc.). The field form is designed so that volunteers simply check boxes or circle yes/no to record presence/absence of a given feature. Other data, such as observations or unique conditions, will be written in spaces provided.

The crossing characteristics include such questions as crossing type (i.e. ford, bridge, arch, culvert, etc.), condition of crossing, river flow characteristics, sediment characteristics, pooling of water up- and downstream of the crossing. Finally, there are cross-sectional measurements required at each crossing, such as height and width of the culvert or bridge (recorded in meters).

In addition to field forms, instructions, measuring tapes, cameras, and safety vests, volunteers will have with them a laminated “cheat sheet” with diagrams and photographs that will depict culverts and the parameters they are assessing. We will develop diagrams, for example, depicting “crossing span” and “bankfull width,” since these are potentially difficult concepts for volunteers. These concepts will also be covered extensively in the indoor and field portion of the training sessions. All volunteers will submit contact information and the names of all volunteers, with location and date of the training session will be recorded in the Site Database.

There are several opportunities on the field form to record general observations as well.

For dams, basic characteristics of the dam are recorded in three sections: dam structure and historic resources, condition of impoundment, and downstream conditions. For Dam Structure, volunteers record type (recreational, flood control, hydropower, etc.), dam

construction material (wood, cobble, concrete, etc.), dam height, basic observations of structural integrity, etc. For Condition of Impoundment, there are questions regarding the water quality, presence of a fish ladder, presence of invasive species, any wildlife sign, etc. Finally, for Downstream Conditions, there are questions about proximity of roads, bridges, erosion, fill, etc. (Appendix B, C).

At each site, at least two photographs will be taken, with one volunteer in the picture holding a dry erase-board with site location information for reference. One photo will be taken at the upstream end, and one at the downstream end of the crossing. One photo at each dam site will be required as well (from the downstream end). All photos will adhere to *Photo Documentation Procedure for Measuring Success of Restoration Projects and Best Management Practices*, provided by DES (Appendix D).

12. Sample Handling and Custody Procedures

No samples will be collected for this project; however field sheets will be filled out at each site and will be submitted or mailed to the QA Officer at AVEO in Keene after each field visit. QA Officer will record that sites have been visited in the Site Database, and make appropriate copies for archiving.

13. Analytical Methods Requirements

No samples will be collected for this project that require analysis, however field information will be used to assess and prioritize fragmenting effect of each crossing using a systematic scoring algorithm (Appendix E). This will be determined based on a synthesis of the field data and the results of a literature review on how species using streams navigate barriers. For example, our literature review may tell us that brook trout can jump into a culvert perched six inches if there is a 14" deep downstream scour pool and swim through two inch deep water. This kind of information will help us prioritize what culverts are available for brook trout passage. We expect that these thresholds are available for some species, but not all.

In order to rank the impact of fragmentation for road –stream crossings, we will adopt a scoring algorithm developed by UMASS and Massachusetts Riverways (Appendix E). This system is based directly on the answers provided in the field forms, and will result in a prioritization of the relative fragmentation impact for each crossing. A "fragmentation score," ranging from one to ten, will be assigned based on the most critical physical features of the crossing, with one depicting "not passable," and ten depicting "passable." This system assumes that fish will not be able to navigate through crossings receiving a zero score, while a ten score indicates the crossing most mimics natural stream conditions. Intermediate scores reflect the range of conditions possible across all sampled crossings.

In addition, certain score ranges will correspond to specific species ability to pass through certain culverts certain. Thresholds of fragmentation will vary by species groups, depending on swimming ability, the timing and season of critical life history events (e.g. breeding), and flow parameters. For example, trout are stronger swimmers than most

other resident fish and they may be able to pass through culverts that weaker swimmers, such as slimy sculpin, can not. We expect to refine the algorithm to reflect information reported in an on-going literature review underway during the field season.

Applying the same algorithm across all sites ensures that the prioritization is systematic. We expect the results to be depicted in a map showing relative fragmentation at each site, based on its fragmentation score. Initial screening results will be vetted with aquatic ecologists, fisheries biologists, and road engineers at the conclusion of the project.

For Dams, we will develop a ranking system based on the miles of river that are rendered unavailable for fish movement. For example, a single dam may make 50 miles of upstream habitat unavailable, while a different dam may only impeded movement for 3 miles. This GIS-based analysis will rank dams based on, given their removal, how much linear river distance would be "opened up" to fish movement. This scoring system will also be updated and refined based on the results of a literature review, conducted during the project. Similar data sets and GIS models have been developed by USGS (e.g. SPARROW), and we will base our GIS model structure on existing datasets.

14. Quality Control Requirements

The Project Manager, Volunteer Coordinator, and QA Officers will re-visit no less than five percent, and no more than ten percent, of field sites in the watershed to ensure that volunteers are collecting information appropriately. The re-visited sites will be selected through a stratified random sampling approach to ensure we re-visit sites throughout the watershed (not just those closest to Keene, for example). We will divide the watershed into upper, middle, and lower reaches for both the mainstem and tributaries, and re-sample representative sites in each. For example, there are a disproportionately high number of crossings in small tributary streams. We will re-visit these stream types in the same proportion as represented in the Watershed.

In addition to a pre-selected number of sites to re-visit, the QA Officer will identify problematic field forms and require re-visits at those sites with inconsistent information. The QA Officer will be trained in the field to ensure they have enough familiarity with field protocols to recognize inconsistencies in submitted field forms. In the event that questions or problems in field forms are identified, the QA Officer will immediately contact the volunteer to discuss inconsistencies and to arrange a second site visit if necessary. In addition the QA Managers (AVEO and TNC) will compare field forms with data entry into the Culvert and Dam Database at least once a week to ensure that data is entered correctly.

15. Instrument / Equipment Testing, Inspection, and Maintenance Requirements

Keson 50 meter fiberglass field tapes will be used to record culvert dimensions. As stated above and in the product description, fiberglass tapes are resistant to change in accuracy from tension and temperature extremes.

If feasible, we will purchase a limited number of digital and/or disposable 35mm cameras for use by volunteers; otherwise we will have to rely on either digital or 35mm cameras provided by volunteers. In addition, we will provide a limited number of Suunto or Silva compasses to volunteers without compasses of their own. During training, we will ensure that volunteers are familiar with the use of all equipment and will be able to detect any malfunctioning gear.

16. Instrument Calibration and Frequency

Upon receipt of field gear, the Project Manager and Volunteer Coordinator will ensure that all instruments were delivered as ordered, are working properly, and all provide the same information (i.e. units, bearings, etc.).

17. Inspection /Acceptance Requirements

Volunteers will be trained to check to ensure that all instruments are in working order prior to taking any field measurements. Any defects will be reported to the Project Manager or Volunteer Coordinator and replacement gear will be provided as soon as possible.

18. Data Acquisition Requirements

This project requires GIS maps to provide volunteers with locations for field sites. Digital USGS topographic quad maps will serve as the backdrop of all maps, with locations determined in GIS (ArcGIS 9.0) by identifying intersections between mapped roads and mapped stream networks. All GIS coverages are from New Hampshire's GRANIT Database (http://www.granit.sr.unh.edu/cgi-bin/load_file?PATH=/data). The GIS dam coverage is from the NH Department of Environmental Services for dams registered with the DES Dam Bureau (2004).

In addition, NH Department of Transportation has provided their NHDOT Bridge Summary. This paper database lists all the NH DOT maintained bridges, organized by town. It compiles information and lists of where bridges are located, their Bridge Coordinate number (unique code), Date of most recent inspection, feature crossed, bridge owner, and information on the type of bridge. This information will be useful to both the volunteer visiting the site, as well as to NH DOT as they will be able to link their bridges to the sites visited, and the data collected at each site. As we analyze and assess aquatic fragmentation and set priorities for implementation, information linked to NHDOT's bridge database will ensure rapid and efficient understanding among partners.

19. Data Management

Field data packets are delivered to volunteers at the training sessions. After field visits, volunteers mail information to the QA Officer at AVEO. The QA Officer will be trained and have field experience. The QA Officer will inspect the field forms for completeness; examine photographs to make sure the field forms make sense given the bridge and culvert type; make two copies of every field form; and record that the sites have been visited in the Site Database. The QA Officer will initial the original field form to indicate it has been inspected prior to making copies.

The QA Officer will enter data from field forms into the Culvert and Dam Database as they come into the office. The original field forms, one copy, and the photographs will be sent to TNC for archiving and analysis once the field season is complete.

20. Assessments and Response Actions

Volunteer performance will be evaluated as part of the volunteer training, which will include a site visit to a typical bridge and/or culvert to ensure volunteers understand all aspects of the field form and the required data collection. We will require that volunteers complete a field form at the site and then will discuss the results and any questions that arise prior to completing the training. Since this project requires work completed during one field season, we will not schedule re-trainings or refresher sessions. In the event that inconsistencies and problems in field forms are identified, the QA Officer will immediately contact the volunteer to discuss inconsistencies and to arrange a second site visit if necessary.

All volunteer activities will be under the responsibility of the Volunteer Coordinator at Ashuelot Valley Environmental Observatory (AVEO). David Moon will be responsible for recruiting, training, organizing, and communicating with volunteers, in close coordination with other Project Officers.

In addition the QA Managers (AVEO and TNC) will compare field forms with data entry into the Culvert and Dam Database at least once a week to ensure that data is entered correctly.

21. Reports

This project will result in a single final report, written and distributed to sponsors, partners, data users, and the public by TNC. We will also provide copies of reports to town halls in the watershed. Interim progress reports as required by New Hampshire Department of Environmental Services will follow the schedule in the Grant Agreement, organized by project task.

22. Data Review, Validation, and Verification

As stated in the Data Management Section, the QA Officer will be trained and have field experience to ensure they can judge if field forms are complete and represent quality information. The QA Officer will inspect the field forms for completeness; and examine photographs to make sure the field forms make sense given the bridge and culvert type.

Also, as stated in the Assessments and Response Actions Section, the Project Manager, Volunteer Coordinator, and QA Officers will re-visit no less than five percent, and no more than ten percent, of field sites in the watershed to ensure that volunteers are collecting information appropriately.

23. Validation and Verification Methods

Given the nature of the variation in bridge, culvert, and dam designs and conditions, a range of variation throughout the sample is expected. However, the QA Officer will inspect all field forms (as previously described), and keep track of the need for a site re-visit to verify results should questions arise. The QA Officer will report to the QA Manager and Project Manager which sites require another site visit and will arrange to re-visit the sites as soon as possible. Data of questionable quality will be noted on field forms and archived. Depending on the questionable fields, the QA Officer might request a second site visit, may choose to delete certain fields from the database, or may delete the entire site from the database so that suspect information does not unduly influence data analysis.

In cases where weather conditions did not allow a site visit during the time in which a volunteer was available, these sites will also be reported and a site re-visit scheduled.

Using our Site Database, we will know what field forms have not been sent in by volunteers. All sites should be visited by September 30, 2006 and delivered to the QA Officer by October 15, 2006. On October 15, we will call or email volunteers assigned to the missing information. If necessary, the sites will be re-assigned to a new volunteer or will require a site visit from the Volunteer Coordinator or Project Manager. In addition, poor quality data sheets, such as components not completed or recorded may require a second field visit.

24. Reconciliation with Data Quality Objectives

Our goal is to visit as many bridges culverts and dams as possible in the entire watershed. Based on experience with other watersheds of this size, we have fairly high confidence that all sites can be sampled with a dedicated team of 25-30 volunteers. However, given our minimum goals defined in the Sampling Process Design Section, we hope to visit at least 90% of the sites we identify (approximately 1,350 road-stream crossings and 135 dams).

If weather, flow conditions, or volunteer participation or performance are incompatible with our 90% goal, we will be required to prioritize field visits to ensure a representative sample of bridges, culverts, and dams are visited. Since we will have already arranged sites by quadrat throughout the watershed (see Sampling Process Design Chapter), we will stratify and prioritize site visits to ensure we are covering a geographically representative sample of sites.

APPENDIX A: New Hampshire Dam Assessment Form

APPENDIX B: Field Data Form: Road-Stream Crossing Inventory

APPENDIX C: Instruction Guide for Field Data Form: Road-Stream Crossing Inventory

APPENDIX D: Photo Documentation Procedure for Measuring the Success of Restoration Projects and Best Management Practices

APPENDIX E: New Hampshire Crossing Structures Scoring System